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| **G**overnment **I**nformation **T**echnology **A**gency | **Statewide** **POLICY** **P730** | **TITLE: <u>Software Architecture</u>** **Effective Date: September 30, 2003** |

1. **AUTHORITY**

   The Government Information Technology Agency (GITA) shall develop, implement and maintain a coordinated statewide plan for information technology (A.R.S. § 41-3504(A (1))), including, the formulation of policies to effectuate the purposes of the agency (A.R.S. § 41-3504(A (13))).

2. **PURPOSE**

   Software Architecture delineates common, industry-wide, open-standards-based technologies (methodologies, tools, principles, etc.) facilitating the design, development, and purchase of software to automate and maintain State and budget unit business processes, and provides a foundation for interoperability, integration, collaboration, and communication.

3. **SCOPE**

   This applies to all budget units. Budget unit is defined as a department, commission, board, institution or other agency of the state organization receiving, expending or disbursing state funds or incurring obligations of the state including the board of regents and the state board of directors for community colleges but excluding the universities under the jurisdiction of the board of regents and the community colleges under their respective jurisdictions and the legislative or judicial branches. A.R.S. § 41-3501(2).

   The Budget Unit Chief Executive Officer (CEO), working in conjunction with the Budget Unit Chief Information Officer (CIO), shall be responsible for ensuring the effective implementation of Statewide Information Technology Policies, Standards, and Procedures (PSPs) within each budget unit.

4. **POLICY**

   Budget units shall utilize Software Architecture target technologies[1], methodologies, standards, and best practices to develop, implement, and/or acquire application systems. Software Architecture supports the economical and efficient development of open, interoperable software solutions that make State information, programs, and services more accessible to the people of Arizona. Software Architecture fosters an environment of software integration, collaboration, and communication, and enables new, business-specific, software applications to be developed more rapidly and modified more easily as business requirements change.

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[1] The Arizona *Target Technology Table* is available at: http://gita.state.az.us/enterprise_architecture/.

4.1.   Software includes the software applications, programming, database, productivity, and utility software that automate State and budget unit business processes and provides a foundation for integration, collaboration, and communication. Software Architecture is independent of any vendor-specific software, platform, network, or security products or set of development tools.

4.2.   Software Architecture addresses software relative to: functionality, adaptability, interoperability, and scalability. Software automates business functions and enhances productivity; therefore, the selection or development focuses primarily on its functionality and adaptability driven by business requirements and rules. Interoperability, critical to bridging disparate budget unit business functions and operations, is instituted through platform independence and use of non-proprietary technologies, capability to exchange information and integrate with other software applications, and the ability to maximize the principles, standards, and best practices delineated in the other EWTA domains. This overall approach aligns with *Statewide Policy P100, Information Technology*, by focusing on technologies utilized by the software processes that automate and support budget unit business functions and requirements.

4.3.   Arizona's Software Architecture consists of:
   1. <u>Software Applications</u> -- systems comprised of programming, productivity, and database software, designed to automate and perform specific business functions such as payroll, accounts payable, MVD vehicle registration, etc.
   2. <u>Programming Software</u> -- enabling technologies and products used to develop and maintain Software Applications, including programming languages (COBOL, C++, Java $^{TM}$, HTML, etc.), middleware technologies to facilitate inter-application communication and interchange of information, report writers, etc.
   3. <u>Database Software</u> -- primarily database management systems to organize and manage data storage, facilitate access to and provide security for, and assure the integrity of the data in database storage.
   4. <u>Productivity Software</u> -- office automation and collaborative software products and tools, such as collaborative groupware, email, calendaring and scheduling, word processing, spreadsheet, presentation, graphic applications, report writers, personal databases, etc., and productivity software components.
   5. <u>Utility Software</u> -- typically an extension of a device's operating system. Target Utility Software is classified as those necessary and appropriate software tools used to maintain and enhance Target Network and Platform Architectures, and more specifically, applicable device operating systems.

   All software utilized by each budget unit shall conform to requirements in *Statewide Policy P252, Intellectual Property*, to fully comply with all legal provisions governing copyright laws and authorial integrity.

4.4. <u>TARGET SOFTWARE ARCHITECTURE ASSESSMENT</u>
Arizona's Software Architecture establishes a framework to assess the alignment of the software applications and the associated programming, database, and productivity software proposed in a PIJ with Enterprise Architecture. Attachment A, Target Software Architecture Assessment, summarized below, describes major attributes and characteristics derived from *Statewide Policy P100, Information Technology*, as well as the principles, standards, and best practices contained in the Target Software Architecture. It provides an architectural tool to determine the "readiness" level of interoperability, functionality, scalability, and adaptability of existing or new software relative to enabling new business opportunities and providing new e-government solutions for delivering service in the future.

**Target Software Architecture Assessment Summary**

| Attributes/Characteristics | Description |
|---|---|
| A. Functionality, scalability, and adaptability, emphasizing client interaction | Designed to fulfill business requirements and maximize the efficiency and effectiveness of business functions: able to scale and adapt as business requirements change and expand. Software that is interoperable, modular, and deployable across the State enterprise. Software that supports e-government and client self-sufficiency through browser-based access, regardless of location. |
| B. Platform independence and use of non-proprietary technologies | Addresses interoperability, portability, and integration across platforms utilizing open and/or de-facto standard protocols, programming languages, middleware, development tools, databases, utilities, etc. |
| C. Exchange of Information, integration with other software | Utilizes common standard interfaces and/or middleware having the ability to interoperate and integrate with other software without custom programming and intermediate interface-specific applications. |
| D. Ability to maximize Target Network, Security, and Platform Architectures | Has the capability to conform to, and adhere to, the standards and best practices delineated in the other domain architectures without requiring substantial modifications. |

4.5. <u>SOFTWARE ARCHITECTURE GENERAL PRINCIPLES</u>
The planning, design and development of Software Architecture are guided by the following general principles that support the State's strategic business goals and objectives.
   4.5.1. Software automates State and budget unit business functions and processes.
   4.5.2. Software applications, including databases, and productivity software shall be designed for interoperability, growth, flexibility, and adaptability.

    4.5.3.  Software applications and productivity software shall be designed, acquired, developed, or enhanced such that information and processes can be securely shared and integrated across the State enterprise as well as with external communities of interest, the public, and applicable service providers.

    4.5.4.  Software shall be implemented with confidentiality and security of information as a high priority.

    4.5.5.  Software applications, programming, database, and productivity software should be interoperable, platform independent, browser-based (where applicable), and n-tier-architecture oriented.

    4.5.6.  Software applications should be designed to be granular and loosely coupled.

    4.5.7.  Middleware should be used for communication between software applications and services.

    4.5.8.  Software applications should be documented.

    4.5.9.  Software applications, programming, database, and productivity software should maximize Target Network, Security, and Platform Architectures to achieve optimal efficiency and effectiveness for the delivery of services to citizens and end-users, regardless of location.

Supporting rationale for the above principles can be found in the *Target Software Architecture* document available at http://gita.state.az.us/enterprise_architecture.

4.6.  <u>SOFTWARE ARCHITECTURE TARGET TECHNOLOGIES</u>
Components of the Target Software Architecture are reviewed and refreshed on a regular and scheduled basis to address major shifts in technology, as well as the emergence and adoption of new technology-related industry or open standards. Review criteria shall adhere to the lifecycle process described in *Statewide Policy P700, Enterprise Architecture*.

4.7.  <u>SOFTWARE ARCHITECTURE STANDARDS</u>
Software Architecture Standards address software relative to: functionality, adaptability, interoperability, and scalability. Refer to Paragraph 6.25, Statewide Standards for Software Architecture, for further information.

4.8.  <u>IMPLEMENTATION</u>
Arizona's EWTA has been designed to maximize current investments in technology, provide a workable transition path to targeted technologies, maintain flexibility, and to enhance interoperability and sharing.
Software Architecture implementations shall adhere to implementation strategies described in *Statewide Policy P700, Enterprise Architecture*.
Software Architecture shall be implemented in accordance with *Statewide Policy P800, IT Security*, and applicable Statewide Standards for Security.

4.9.  <u>CONFORMANCE OF IT INVESTMENTS AND PROJECTS TO EA</u>
To achieve the benefits of an enterprise-standards-based architecture, all information technology investments shall conform to the established EWTA that is designed to ensure the integrity and interoperability of information

technologies for budget units. *Statewide Standard P340-S340, Project Investment Justification (PIJ)*, defines conformance with the established EWTA and associated Statewide Policies and Standards. Variances from the established EWTA shall be documented and justified in the appropriate section of the PIJ document.

4.10 <u>APPLICABILITY TO OTHER STATEWIDE EA POLICIES AND STANDARDS</u>
*Statewide Policy P730, Software Architecture*, adheres to, and demonstrates the purpose established in *Statewide Policy P100, Information Technology*.

*Statewide Policy P730, Software Architecture*, adheres to the principles, governance, lifecycle process, and implementation elements described in *Statewide Policy P700, Enterprise Architecture*.

5. **DEFINITIONS AND ABBREVIATIONS**
Refer to the Glossary of Terms located on the GITA website at http://www.gita.state.az.us/policies_standards for definitions and abbreviations.

6. **REFERENCES**
6.1.   A. R. S. § 41-621 et seq., "Purchase of Insurance; coverage; limitations, exclusions; definitions."
6.2.   A. R. S. § 41-1335 ((A (6 & 7))), "State Agency Information."
6.3.   A. R. S. § 41-1339 (A), "Depository of State Archives."
6.4.   A. R. S. § 41-1461, "Definitions."
6.5.   A. R. S. § 41-1463, "Discrimination; unlawful practices; definition."
6.6.   A. R. S. § 41-1492 et seq., "Prohibition of Discrimination by Public Entities."
6.7.   A. R. S. § 41-2501 et seq., "Arizona Procurement Codes, Applicability."
6.8.   A. R. S. § 41-3501, "Definitions."
6.9.   A. R. S. § 41-3504, "Powers and Duties of the Agency."
6.10.  A. R. S. § 41-3521, "Information Technology Authorization Committee; members; terms; duties; compensation; definition."
6.11.  A. R. S. § 44-7041, "Governmental Electronic Records."
6.12.  Arizona Administrative Code, Title 2, Chapter 7, "Department of Administration Finance Division, Purchasing Office."
6.13.  Arizona Administrative Code, Title 2, Chapter 10, "Department of Administration Risk Management Section."
6.14.  Arizona Administrative Code, Title 2, Chapter 18, "Government Information Technology Agency."
6.15   State of Arizona Target Network Architecture.
6.16   State of Arizona Target Platform Architecture.
6.17   State of Arizona Target Software Architecture.
6.18   Statewide Policy P100, Information Technology.
6.19   Statewide Policy P252, Intellectual Property.
6.20   Statewide Policy P340, Project Investment Justification (PIJ).
       6.20.1  Statewide Standard P340-S340, Project Investment Justification (PIJ).
6.21   Statewide Policy P700, Enterprise Architecture
6.22   Statewide Policy P710, Network Architecture.

6.23    Statewide Policy P720, Platform Architecture.

6.24    Statewide Policy P800, IT Security.

6.25    Statewide Standards for Software Architecture.

      6.25.1  Statewide Standard P730-S730, Applications and Related Software.

      6.25.2  Statewide Standard P730-S731, Software Productivity Tools.

**7.    ATTACHMENTS**

Attachment A. Target Software Architecture Assessment.

**Attachment A.  Target Software Architecture Assessment.**

This assessment is an architectural tool intended to determine the "readiness" level of interoperability, functionality, scalability, and adaptability of existing software relative to enabling new business opportunities and providing new e-government solutions for delivering service in the future. It is designed to support the planning and implementation of Target Software Architecture principles, standards, and best practices. It addresses the alignment of the software applications and associated programming, database, productivity, and utility software proposed in a PIJ with Enterprise Architecture. It describes major attributes and characteristics derived from *Statewide Policy P100, Information Technology*, and the principles and standards and best practices contained in the Target Software Architecture.

Ratings for programming, database, and productivity software are based on the latest production release of the software. Utility software products used in conjunction with target network and platform architectures are considered target.

This assessment is applicable for all software reported to the Information Services Inventory System (ISIS) as defined by *Statewide Standard P800-S815, Configuration Management Standard*.

**Score.** Questions for the four (4) software categories are scored with one (1) point for a "Yes" answer and zero (0) for a "No" answer. **Maximum possible** is the total number of questions for each category.

**Agency/Community of Interest:**  _____
**Software Application:**
_____

| Attributes/Characteristics | Maximum Possible | Score | Description |
|---|---|---|---|
| A. Functionality, scalability, and adaptability, emphasizing client interaction **(Software Applications only)** | 5 | | Software Applications designed to fulfill business requirements and maximize the efficiency and effectiveness of business functions with the ability to scale and adapt as business requirements change and expand; that are interoperable, modular, and deployable across the State enterprise; and that support e-government and client self-sufficiency through browser-based access, regardless of location. |
| B. Platform independence and use of non-proprietary technologies | 5 | | Addresses interoperability, portability, and integration across platforms utilizing open and/or de-facto standard protocols, programming languages, middleware, development tools, databases, utilities, etc. |
| C. Exchange of information, integration with other software | 5 | | Utilizes common, standard interfaces and/or middleware having the ability to interoperate and integrate with other software without requiring custom programming or intermediate, interface-specific applications. |
| D. Ability to maximize (take full advantage of) Target Network, Security, and Platform Architectures | 5 | | Has the capability to conform to, and adhere to, the standards and best practices delineated in the other domain architectures without requiring substantial modifications. |
| **Total Rating Points** | 20/15 | | |

**Agency/Community of Interest:** _____

**Software Application:** _____

| | Yes |
|---|---|
| **A. Functionality, scalability, and adaptability** refer to software applications that maximize the efficiency and effectiveness of business functions and have the ability to scale and adapt as business requirements change and expand; are interoperable, modular, and deployable across the State enterprise; and that emphasize e-government and client self-sufficiency through browser-based access, regardless of location. **(Software Applications only)** | **Yes** |
| 1. Is the software application extensible (capable of being expanded or customized), adaptive (the adjustment or modification that makes something more fit given the conditions of its environment), and capable of accommodating increased demands for service without substantial modifications and additional costs? | |
| 2. Is the software application developed and deployed utilizing open and/or de-facto standard protocols, languages, development tools, databases, etc.? | |
| 3. Is a browser or GUI presentation layer available for the software application? | |
| 4. Does the software application emulate the "look and feel" of the client device's operating system and productivity software? | |
| 5. Does the software application support e-government solutions and/or end user self-sufficiency or self-service? | |
| **B. Platform independence and use of non-proprietary technologies** addresses interoperability and portability across platforms utilizing open and/or de-facto standard protocols, programming languages, middleware, development tools, databases, utilities, etc. | |
| 1. Is the *software*, as configured, portable, and accessible across platforms in use within the subject agencies or community of interest? | |
| 2. Is the *software*, including version levels, consistent with current deployments of like or similar *software* within the subject agencies or community of interest? | |
| 3. Is the *software*, as configured, platform independent, without proprietary issues and requirements? | |
| 4. Is the *software* designed for, and/or supports, n-tier-oriented architecture deployment and implementation? | |
| 5. Does the *software* allow for, or provide open and/or de-facto standard interfaces for, a variety of end-user client devices, server and storage platforms, and database products? | |
| **C. Exchange of information, integration with other software** emphasizes common standard interfaces and/or middleware having the ability to interoperate and integrate with other software without requiring custom programming and intermediate interface-specific applications. | |
| 1. Does the *software*, as configured, provide for and/or support (directly or through extensions) the transparent transfer and exchange of information with other software products through open or de-facto industry standards? | |
| 2. Does the *software* utilize target middleware technologies or open or de-facto industry standards for communicating and exchanging information with other software products? | |
| 3. Does the *software* provide for and/or support the integration of, or interfacing with, productivity software currently deployed within the subject agencies or community of interest? | |
| 4. Does the *software* provide the capability for sharing common software services and potential reuse of components? | |
| 5. Is the *software*, as configured, unrestricted by any proprietary or vendor-specific integration requirements? | |

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| **D. Ability to maximize Target Network, Security, and Platform Architectures** addresses the capability to conform to, and adhere to, the standards and best practices delineated in the other domain architectures, without requiring substantial modifications. | |
| 1. Is the *software* capable of providing and/or supporting secure (as defined by the AZ EA Target Security Architecture) end-user interface access without substantial modifications, regardless of end-user location? | |
| 2. Does the *software*, as configured, utilize target Network and Platform operating systems? | |
| 3. Are the versions of the target Network and Platform operating systems utilized by the *software* consistent with current deployments within the subject agencies or community of interest? | |
| 4. Do the security services included with the *software* align with Target Security Architecture and adhere with all security, confidentiality, and privacy policies as well as applicable statutes? If no security services are included, is the *software* unrestricted to align with Target Security Architecture? | |
| 5. Is the *software* capable of being managed and maintained with standard SNMP-based management tools? | |
| **Total Rating Points** | |